



COPY  
2

LAND SURVEYOR - 1986

Part A - Wt. 52.5

1. This examination is given in two, four-hour periods on the same day. The subject matter relates to the principles and practice of land surveying. Part A is the first section of this two-part examination. ALL PROBLEMS IN PART A ARE REQUIRED.
2. Each test item is contained in a separate folder appropriately marked on the front. Your answers must be completed on the paper provided within each folder. IMPORTANT: Do not remove the test item or your answer sheets from the folder as this may affect the Board's ability to grade your examination. If you need additional grid sheets, ask your proctor. Be sure to secure these additional pages within the appropriate folder.
3. You may withdraw from scoring any part of your work by isolating that part and writing "VOID" across it. Delineate the voided part clearly.
4. Enter your identification number in the upper right-hand corner on EACH PAGE of the answer sheets where space is provided and INDICATE THE APPROPRIATE PROBLEM NUMBER.
5. Your work is a Land Surveyor report. Computations should be neat and orderly and show a good basic, orderly development of the problem solution.
6. This portion of the Land Surveyor Examination consists of the following:

Problem A-1	12.5 points
Problem A-2	10.0 points
Problem A-3	10.0 points
Problem A-4	10.0 points
Problem A-5	<u>10.0 points</u>
TOTAL	52.5 points

ALL PROBLEMS IN PART A ARE REQUIRED.

7. After you have completed this portion of the examination, check your work, assemble the folders containing your answer sheets in sequential order, be sure to include all pages (including diagrams if required), and turn it in to the Examination Proctor.

Department of Consumer Affairs  
State Board of Registration for Professional Engineers  
and Land Surveyors

1986

Problem Al Wt. 12.5 points

PROBLEM STATEMENT

The following questions relating to subdivisions in California are based on the existing laws in effect January 1986. Answer each of the following questions and cite the appropriate references.

1. What conditions must exist in order to compile a map from recorded data?
2. What map can be compiled from record?
3. When a field survey is required for a subdivision, to what state standard must it conform?
4. Who can prepare a parcel or final map?
5. A final map is required for which subdivisions?
6. A parcel map is required for which subdivisions?
7. For what reasons are Certificate of Corrections or Amending Maps filed?
8. What does a local ordinance regulate regarding a parcel or final map?
9. When is it mandatory for local agencies to disapprove a Subdivision Map?
10. Who shall examine a parcel or final map?

The following questions relating to the California Land Surveyors Act are based on the existing laws in effect January 1986. Answer each of the following questions and cite the appropriate references.

11. What act or activities performed by a person constitutes the practice of land surveying within the meaning of the Land Surveyors Act?
12. On what items is it mandatory for a licensed Land Surveyor to place his signature and show his license number, or stamp his seal?
13. List those titles that are reserved to a licensed Land Surveyor by law.
14. Who is vested with the power to administer the provisions and requirements of the Land Surveyors Act?
15. When may a licensed Land Surveyor administer or certify oaths?
16. When is it mandatory for a surveyor to file a Record of Survey?
17. What are the mandatory requirements that outline the contents of a Record of Survey Map?

Problem A1 - continued:

18. What are the mandatory requirements that prescribe the form of a Record of Survey Map?
19. Whose signatures are required on a Record of Survey Map?
20. When is it mandatory for a surveyor to file a Corner Record?

The following questions relate to subdivisions in California. They are based on existing State laws in effect as of January 1986. State whether each statement is true or false. If false, explain why the portion is incorrect and cite applicable law and sections.

21. When there is sufficient survey information existing on a filed map and at least one of the boundary lines is monumented, a parcel map may be compiled as shown on record.
22. Only the County Surveyor may examine a Parcel Map.
23. A Parcel, Reversion to Acreage, or Final Map may be compiled from record.
24. By State law, a tentative map shall expire 18 months after approval.
25. A final map is required for all subdivisions of five or more parcels.

Problem A2 - Wt. 10.0 points

PROBLEM STATEMENT

The following page is reproduced data based upon the California Coordinate System - Zone V.

The drawing below shows a Section Corner with a reference to another station.

For  $\Delta$  TRANS  
 $\phi = 34^{\circ}13'25.50161N$   
 $\lambda = 118^{\circ}50'10.12362W$   
Elev = 509<sup>8</sup> metres

Constants for Zone V

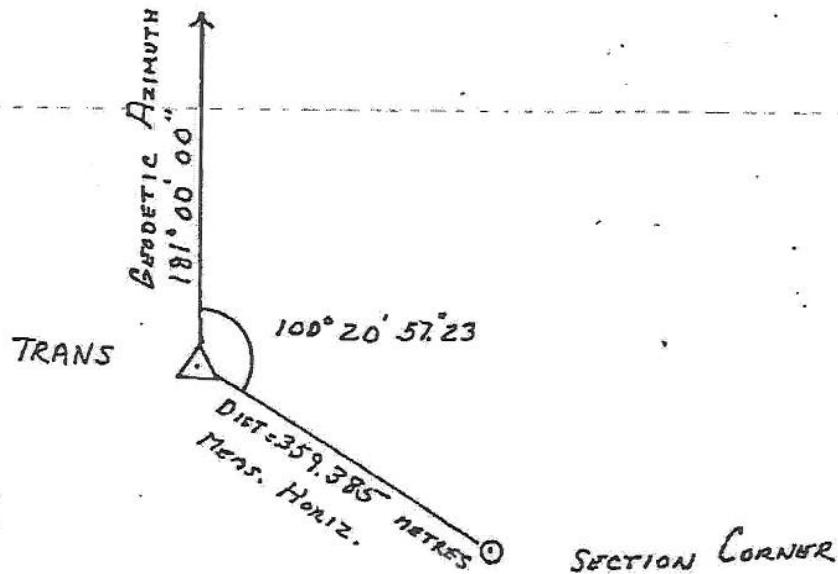
Central Meridian =  $118^{\circ}00'$   
 $R_b = 30,649,424.27$   
 $C = 2,000,000.00$

Mean radius of the earth = 20,945,000 ft.

REQUIRED:

Determine the coordinates (Northing & Easting) of the Section Corner in Zone V. Express final answer to the nearest 0.01 ft. Show all of your work.

To AZIMUTH MARK



	Sine	Tab. diff.	Cosine	Tab. diff.	Tangent	Tab. diff.
20 00	.00581 77314	484 805	.99998 30769	2833	.00581 78298	484 830
10	.00586 62119	484 805	.99998 27936	2855	.00586 63128	484 831
20	.00591 46924	484 805	.99998 25081	2880	.00591 47939	484 831
30	.00596 31729	484 805	.99998 22201	2903	.00596 32790	484 831
40	.00601 16534	484 805	.99998 19298	2926	.00601 17621	484 831
50	.00606 81339	484 805	.99998 16372	2950	.00606 82458	484 832
21 00	.00610 86144	484 804	.99998 13422	2973	.00610 87284	484 832
10	.00615 70948	484 804	.99998 10449	2997	.00615 72116	484 832
20	.00620 55753	484 804	.99998 07452	3020	.00620 56940	484 832
30	.00625 40557	484 804	.99998 04432	3044	.00625 41780	484 833
40	.00630 25361	484 804	.99998 01358	3067	.00630 26613	484 833
50	.00635 10165	484 804	.99997 98321	3091	.00635 11446	484 834
22 00	.00639 94969	484 804	.99997 95230	3114	.00639 96280	484 833
10	.00644 79773	484 803	.99997 92116	3138	.00644 81113	484 834
20	.00649 64576	484 804	.99997 88976	3161	.00649 85947	484 835
30	.00654 49380	484 803	.99997 85817	3185	.00654 50762	484 834
40	.00659 34183	484 803	.99997 82632	3209	.00659 35616	484 835
50	.00664 18986	484 803	.99997 79423	3231	.00664 20451	484 835
23 00	.00669 03789	484 803	.99997 76192	3256	.00669 05286	484 836
10	.00673 88592	484 802	.99997 72936	3279	.00673 90122	484 836
20	.00678 73394	484 803	.99997 69657	3302	.00678 74938	484 836
30	.00683 56197	484 802	.99997 66355	3326	.00683 59794	484 836
40	.00688 42999	484 802	.99997 63029	3349	.00688 44630	484 837
50	.00693 27801	484 802	.99997 59680	3373	.00693 29467	484 837
24 00	.00698 12603	484 802	.99997 56307	3396	.00698 14304	484 838
10	.00702 97405	484 801	.99997 52911	3420	.00702 99142	484 838
20	.00707 82206	484 802	.99997 49491	3444	.00707 83980	484 838
30	.00712 67008	484 801	.99997 46047	3466	.00712 68818	484 838
40	.00717 51809	484 801	.99997 42581	3491	.00717 53656	484 839
50	.00722 36610	484 801	.99997 39090	3514	.00722 38495	484 839
25 00	.00727 21411	484 801	.99997 35576	3537	.00727 23334	484 840
10	.00732 06212	484 801	.99997 32039	3561	.00732 08174	484 839
20	.00736 91013	484 800	.99997 28478	3584	.00736 93013	484 841
30	.00741 75813	484 800	.99997 24894	3608	.00741 77854	484 840
40	.00746 60613	484 800	.99997 21286	3632	.00746 62694	484 841
50	.00751 45413	484 800	.99997 17654	3655	.00751 47535	484 841
26 00	.00756 30213	484 800	.99997 13999	3678	.00756 32376	484 842
10	.00761 15013	484 800	.99997 10321	3702	.00761 17218	484 842
20	.00765 99013	484 799	.99997 06619	3725	.00765 02060	484 842
30	.00770 84612	484 799	.99997 02894	3749	.00770 06902	484 843
40	.00775 69411	484 799	.99996 99145	3773	.00775 71745	484 843
50	.00780 54210	484 799	.99996 95372	3796	.00780 84588	484 843
27 00	.00785 39009	484 799	.99996 91576	3819	.00785 41431	484 844
10	.00790 83808	484 798	.99996 87757	3843	.00790 26273	484 844
20	.00795 88606	484 798	.99996 83934	3866	.00795 11119	484 845
30	.00800 93404	484 798	.99996 80048	3890	.00800 95964	484 845
40	.00804 78202	484 798	.99996 76158	3914	.00804 80809	484 845
50	.00809 63000	484 798	.99996 72244	3937	.00809 65654	484 846
28 00	.00814 47798	484 797	.99996 68307	3960	.00814 80500	484 846
10	.00819 32595	484 798	.99996 64347	3984	.00819 95346	484 846
20	.00824 17393	484 797	.99996 60363	4008	.00824 20192	484 847
30	.00829 02190	484 797	.99996 56355	4031	.00829 05039	484 847
40	.00833 86967	484 796	.99996 52324	4054	.00833 89886	484 848
50	.00838 71783	484 797	.99996 48270	4078	.00838 74734	484 848
29 00	.00843 56580	484 796	.99996 44192	4101	.00843 59582	484 848
10	.00848 41376	484 796	.99996 40091	4125	.00848 44430	484 849
20	.00853 26172	484 796	.99996 35966	4149	.00853 29279	484 849
30	.00858 10968	484 796	.99996 31817	4172	.00858 14128	484 850
40	.00862 95764	484 796	.99996 287645	4195	.00862 98978	484 850
50	.00867 80560	484 795	.99996 23450	4219	.00867 83628	484 850
30 00	.00872 65355		.99996 19231		.00872 68578	

Corrections for Second Difference of Cosine

Seconds	Correction 10th Place
11 9	+1
24 2	+2
31 7	+3
48 6	+1
58 5	+3

O°

	Sine	Tab. diff.	Cosine	Tab. diff.	Tangent	Tab. diff.
30' 00"	.00672 65355	484 795	.99996 19231	4243	.00672 66678	484 851
10	.00877 50150	484 795	.99996 14988	4266	.00877 53529	484 851
20	.00882 34945	484 795	.99996 10722	4289	.00882 38380	484 852
30	.00887 19740	484 794	.99996 06433	4313	.00887 23232	484 852
40	.00892 04534	484 795	.99996 02120	4337	.00892 08064	484 852
50	.00896 89329	484 794	.99996 97783	4360	.00896 92936	484 853
31' 00"	.00901 74123	484 793	.99995 93423	4383	.00901 77789	484 853
10	.00906 58916	484 794	.99995 85040	4407	.00906 62642	484 854
20	.00911 43710	484 794	.99995 84633	4431	.00911 47496	484 854
30	.00916 28504	484 793	.99995 80202	4454	.00916 32350	484 855
40	.00921 13297	484 793	.99995 75748	4478	.00921 17205	484 855
50	.00925 98090	484 793	.99995 71270	4501	.00925 62060	484 855
32' 00"	.00930 82883	484 792	.99995 66749	4524	.00930 86915	484 856
10	.00935 67675	484 792	.99995 62245	4548	.00935 71771	484 857
20	.00940 52467	484 793	.99995 57697	4572	.00940 55628	484 856
30	.00945 37260	484 791	.99995 53125	4595	.00945 41464	484 858
40	.00950 22051	484 792	.99995 48530	4618	.00950 26348	484 857
50	.00955 06843	484 792	.99995 43913	4642	.00955 11199	484 858
33' 00"	.00959 91635	484 791	.99995 39270	4666	.00959 96057	484 859
10	.00964 76426	484 791	.99995 34604	4689	.00964 80916	484 859
20	.00969 61217	484 791	.99995 29915	4712	.00969 65775	484 860
30	.00974 46006	484 790	.99995 25203	4737	.00974 50635	484 860
40	.00979 30798	484 791	.99995 20466	4759	.00979 35465	484 860
50	.00984 15589	484 790	.99995 15707	4783	.00984 20315	484 861
34' 00"	.00989 00379	484 789	.99995 10984	4807	.00989 05216	484 861
10	.00993 85160	484 790	.99995 06117	4830	.00993 90077	484 862
20	.00996 69958	484 789	.99995 01287	4853	.00996 74939	484 862
30	.01003 54747	484 790	.99994 96434	4878	.01003 59801	484 863
40	.01008 39957	484 789	.99994 91556	4900	.01008 44664	484 863
50	.01013 24326	484 788	.99994 86656	4924	.01013 29527	484 864
35' 00"	.01018 09114	484 789	.99994 81738	4948	.01018 14391	484 864
10	.01022 93903	484 788	.99994 76784	4971	.01022 92255	484 865
20	.01027 78691	484 788	.99994 71813	4995	.01027 84180	484 865
30	.01032 63479	484 787	.99994 66818	5018	.01032 68985	484 866
40	.01037 48256	484 785	.99994 61800	5041	.01037 53851	484 866
50	.01042 33034	484 787	.99994 56759	5065	.01042 38717	484 866
36' 00"	.01047 17641	484 787	.99994 51694	5089	.01047 23583	484 867
10	.01052 03628	484 787	.99994 46605	5112	.01052 08450	484 868
20	.01056 87415	484 786	.99994 41493	5136	.01056 93318	484 868
30	.01061 72201	484 787	.99994 36357	5159	.01061 78186	484 869
40	.01066 56986	484 786	.99994 31198	5182	.01066 63055	484 869
50	.01071 41774	484 785	.99994 26016	5207	.01071 47924	484 869
37' 00"	.01076 26559	484 786	.99994 20809	5229	.01076 32793	484 870
10	.01081 11345	484 785	.99994 15580	5253	.01081 17663	484 871
20	.01085 96130	484 785	.99994 10327	5277	.01086 03534	484 871
30	.01090 80915	484 785	.99994 05050	5300	.01090 87405	484 872
40	.01095 65700	484 784	.99993 99750	5324	.01095 72277	484 872
50	.01100 50884	484 784	.99993 94426	5347	.01100 57149	484 873
38' 00"	.01105 35265	484 784	.99993 89079	5371	.01105 42023	484 873
10	.01110 20052	484 784	.99993 83708	5394	.01110 26695	484 873
20	.01115 04836	484 783	.99993 76314	5417	.01115 11768	484 875
30	.01119 89619	484 783	.99993 72897	5442	.01119 94643	484 874
40	.01124 74402	484 783	.99993 67455	5464	.01124 81317	484 876
50	.01129 59185	484 783	.99993 61991	5488	.01129 66393	484 876
39' 00"	.01134 43968	484 782	.99993 56503	5512	.01134 51269	484 875
10	.01139 26750	484 782	.99993 50991	5535	.01139 36143	484 877
20	.01144 11352	484 782	.99993 45456	5559	.01144 81028	484 877
30	.01148 98314	484 782	.99993 39897	5582	.01148 05099	484 878
40	.01153 83096	484 781	.99993 34315	5606	.01153 90777	484 879
50	.01158 67877	484 781	.99993 28709	5629	.01158 75656	484 879
40' 00"	.01163 52658		.99993 23080		.01163 60535	

Correction for Second Difference of Cosines

Seconds	Correction 10th Place
0 2 10	0
1 8 9	+1
2 6 8	+2
3 8 7	+3
4 6 6	+3
5 4 5	+3

## Lambert Projection for California V

Table I (Cont'd)

Lat.	R feet	y value on central meridian feet	Tabular difference for 1 sec. of lat.	Scale in units of 7th place of logs	Scale expressed as a ratio
34° 06'	30,431,073.26	216,351.01	101.08567	-59.9	0.9999862
07	30,425,008.12	224,416.15	101.08567	-73.9	0.9999830
-08	30,418,942.98	230,481.29	101.08550	-87.6	0.9999798
-09	30,412,877.85	236,546.42	101.08550	-100.9	0.9999758
-10	30,406,812.72	242,611.55	101.08550	-113.9	0.9999738
34° 11'	30,400,747.59	248,676.68	101.08533	-126.5	0.9999709
12	30,394,682.47	254,741.80	101.08550	-138.7	0.9999681
13	30,388,617.34	260,806.93	101.08550	-150.6	0.9999653
14	30,382,552.21	266,872.06	101.08550	-152.1	0.9999627
15	30,376,487.08	272,937.19	101.08550	-173.2	0.9999601
34° 16'	30,370,421.95	279,002.32	101.08550	-184.0	0.9999576
17	30,364,356.82	285,067.45	101.08567	-194.4	0.9999552
18	30,358,291.68	291,132.59	101.08567	-204.5	0.9999529
19	30,352,226.54	297,197.73	101.08567	-214.2	0.9999507
20	30,346,161.40	303,262.87	101.08567	-223.5	0.9999485
34° 21'	30,340,096.26	309,328.01	101.08583	-232.5	0.9999465
22	30,334,031.11	315,393.16	101.08600	-241.0	0.9999445
23	30,327,965.95	321,458.32	101.08600	-249.3	0.9999426
24	30,321,900.79	327,523.48	101.08617	-257.2	0.9999408
25	30,315,835.62	333,588.65	101.08617	-264.6	0.9999391

## Lambert Projection for California V

Table II (Cont'd)

1° of Long. = 0°57001192 of θ

Long.	θ	Long.	θ	Long.	θ
117° 31'	+0° 16' 31.6207	118° 06'	-0° 03' 25.2043	118° 41'	-0° 23' 22.2293
32	+0 15 57.6200	07	-0 03 59.4050	42	-0 23 56.4300
33	+0 15 23.4193	08	-0 04 33.6057	43	-0 24 30.6308
34	+0 14 49.2186	09	-0 05 07.8064	44	-0 25 04.8315
35	+0 14 15.0179	10	-0 05 42.0072	45	-0 25 39.0322
117° 36'	+0 13 40.8172	118° 11'	-0 06 16.2079	118° 46'	-0 26 13.2329
37	+0 13 06.6165	12	-0 06 50.4086	47	-0 26 47.4336
38	+0 12 32.4157	13	-0 07 24.6093	48	-0 27 21.6343
39	+0 11 58.2150	14	-0 07 58.8100	49	-0 27 55.8351
40	+0 11 24.0143	15	-0 08 33.0107	50	-0 28 30.0358
117° 41'	+0 10 49.5136	118° 16'	-0 09 07.2114	118° 51'	-0 29 04.2365
42	+0 10 15.6129	17	-0 09 41.4122	52	-0 29 38.4372
43	+0 09 41.4122	18	-0 10 15.6129	53	-0 30 12.6379
44	+0 09 07.2114	19	-0 10 49.5136	54	-0 30 46.8386
45	+0 08 33.0107	20	-0 11 24.0143	55	-0 31 21.0393
117° 46'	+0 07 58.8100	118° 21'	-0 11 58.2150	118° 56'	-0 31 55.2401
47	+0 07 24.6093	22	-0 12 32.4157	57	-0 32 29.4408
48	+0 06 50.4086	23	-0 13 06.6165	58	-0 33 03.6115
49	+0 06 16.2079	24	-0 13 49.5136	59	-0 33 57.8422
50	+0 05 42.0072	25	-0 14 15.6129	119° 00'	-0 34 12.0429

Problem A3 - Wt. 10.0 points

PROBLEM STATEMENT

The sketch below shows Tentative Parcel Map Number 12687, based on record data, proposing the subdivision of Lot 18, Tract 400, into three parcels. The Tentative Map has been approved along with a waiver of Final Parcel Map. (No Parcel Map need be filed.)

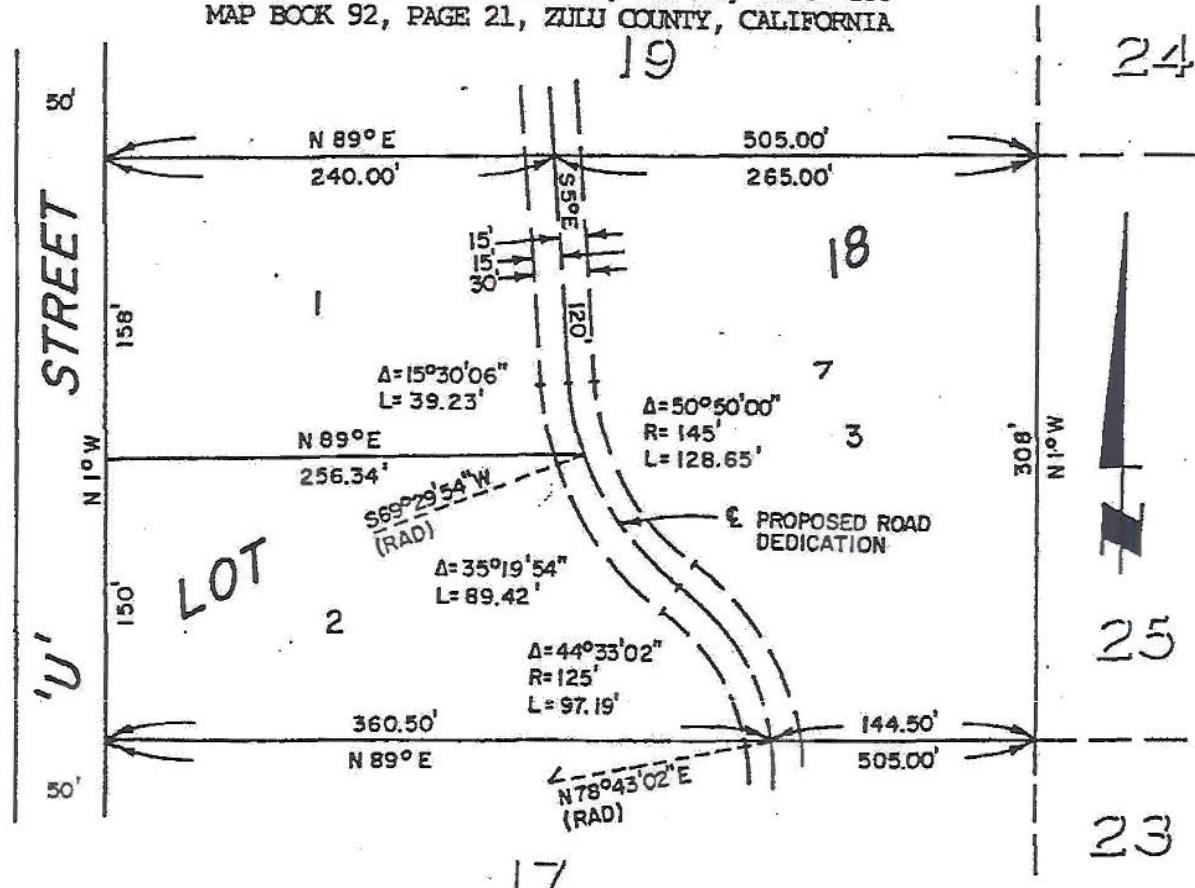
In order to complete the subdivision process, the County requires that a Certificate of Compliance be prepared and recorded and that the 30.00 foot road easement be dedicated to the County by a separately recorded document. The bearings and dimensions shown are record or calculated from record per Tract 400 and are not the result of a survey.

REQUIRED

- (1) Prepare a Legal Description for the road easement. Include the caption.
- (2) Prepare Legal Descriptions for proposed Parcels 1, 2 and 3 in such a way that if a survey reveals different bearings and dimensions from those shown on Tract 400, no gaps or overlaps will result. Include captions. Each description must stand alone. If reference is made to the road easement, the entire description need not be rewritten, just referred to.

NO CALCULATIONS ARE REQUIRED.

TENTATIVE PARCEL MAP 12687, LOT 18, TRACT 400  
MAP BOOK 92, PAGE 21, ZULU COUNTY, CALIFORNIA



Problem A4 - Wt. 10.0 points

PROBLEM STATEMENT

The sketch below shows portions of two townships surveyed in 1886 and some subsequent surveys.

You may assume the original government notes and plat are in agreement.

All dimensions shown are record, except those followed with an M, which designate those measured in 1986.

All corners normally set by the GLO surveyors were found, except the following:

N 1/4 corner Sec. 7                    SW Corner Sec. 7

These are to be regarded as being lost corners.

Your client has title to the NE 1/4 of the SW 1/4 of Sec. 7. He asks you to survey and monument his property.

REQUIRED

1. Describe what you would do.
2. What monuments would you set?
3. What surveying and mapping requirements of the State of California would you comply with?

In particular, few calculations are needed to answer this problem, but method of establishment must be mentioned. If any proportioning is used, show the elements of the proportion.

